

Smolt and yearling outmigrations... Continued

Migration studies indicate that smolts leave the San Joaquin tributaries en route to the ocean in April and May of drier water years. Survival studies suggest that significant mortality occurs in the tributaries, before reaching the Delta, under existing streamflow schedules.

See Action 2.a.

- b. Augment April and May flow at Vernalis and into the South Delta.

Once smolts reach the San Joaquin River movement rates slow and exposure to predation, high water temperature and other factors increases. A basin-wide water scheduling approach is needed to obtain tributary streamflow contributions at the proper times and amounts to speed outmigration and optimize the survival benefits to salmon. The "controlled freshet" evaluation proposed by the Department of Fish and Game in the recent State Water Resources Control Board Hearings could be beneficial.

See Actions 2.a.

- c. Operate the State and Federal Water Projects in a manner that provides a positive San Joaquin River flow downstream through the San Joaquin Delta in April and May.

In the South Delta smolt mortality is high until they have migrated beyond the influence (direct and indirect) of the State and Federal water export facilities. Generally a net downstream flow increases the survival rates through the area of high mortality. Early study results suggest that survival may increase significantly once migrating San Joaquin smolts reach the mouth of the Mokelumne River. Operational changes at the State and Federal facilities, linking Delta exports with Vernalis flows to create a net downstream flow while San Joaquin smolts are actively migrating, may greatly improve survival. Combining this action with "controlled freshets," improved screening, and a complete barrier in upper Old River further may improve the likelihood of significant survival benefits. The State Water Resource Control Board's Draft Decision 1630 acknowledges these concepts and may put in place the hydraulic conditions and a monitoring effort to evaluate the benefits of such a program.

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- d. Install fish protective devices on agricultural or other diversions in the San Joaquin River and South Delta.

The delays associated with major capital outlay for large new screens may be avoided if temporary fish screening technologies are used. Some diversions may have a greater probability to impact migrating salmon and this may change each year depending on the distribution of spawning in the tributaries. Temporary screens or electrical/sound devices that provide significant benefits may ultimately lead to permanent facilities. Other diversion have existing screens that could be repaired or modified to provide improved screening efficiency. If screening (or treating) additional diversions proves effective, and the ability to fund and maintain these devices increases, proceed with plans for permanent facilities where appropriate.

Accelerate upgrading or refurbishing existing devices. Define construction, operation and maintenance responsibilities. Monitor efficacy and schedule further improvements.

See Action 3.g.

- e. Evaluate the use of alternative water supplies for riparian diversions during April and May.

Riparian diversion from the lower San Joaquin River can remove 25 to 60 percent of the total river volume during low flow periods. Due to low instream flow allocations from the tributaries the mainstem flows are generally low and riparian water demand is high during the April-May migration period. Alternative water supplies (e.g., CVP delivery from the Delta Mendota Canal) during this short period each spring may reduce the need for a fish protective device while increasing the streamflow into the Delta.

- f. Develop and implement actions that maintain acceptable water quality in the nursery tributaries and the lower San Joaquin River during the April-May outmigration period.

Specific temperature criteria for this life stage may need further definition through field and laboratory studies depending on the outcome of the State Water Resources Control Board's Bay-Delta Hearing process.

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Implementation of streamflow improvement actions may help reduce exposure to temperature impacts and influence acclimation and temperature gradients.

The existing temperature models on the Tuolumne and Stanislaus rivers may prove useful in assessing the benefits of various operational measures to reduce water temperature.

Evaluation of minimum storage pools and the potential benefits of multi-elevation outlets in the large reservoirs upstream of the designated spawning areas should be completed.

The addition of a new offstream storage reservoir in the Merced River drainage (e.g., Montgomery Reservoir) managed in concert with the existing reservoirs may increase the amount of cool water available for instream fishery use.

Central Valley Regional Water Quality Control Board studies have indicated that there is periodic toxicity in the east side tributaries and the San Joaquin River during winter and spring months. The pesticide levels are toxic to invertebrates which may affect the availability of food or the overall health of young salmon.

Researchers at the Dixon Field Station of the National Fisheries Contaminant Research Center performed a survey of trace element accumulation and toxicity of agricultural drainage water co-mingled with San Joaquin River water. Their results indicated that the elevated concentrations, and perhaps combinations, of trace elements and ions (e.g., Na_2SO_4 - sodium sulfate) associated with some San Joaquin Valley agricultural drainage water may reduce juvenile salmon growth and increase mortality.

See Actions 2.b., 2.i., and 3.a. for the egg and juvenile life stages.

- g. Evaluate and install a complete barrier at the head of Old River from April 1 through May 31 each year, in conjunction with other South Delta water quality barriers, and monitor its effectiveness.

Studies to date indicate that significant improvements in survival may accrue if smolts migrate down the San Joaquin River past Stockton, avoiding direct diversion

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to the State and Federal export facilities. A detailed evaluation of a complete barrier in Old River is underway as part of the Temporary Barriers Project. Evaluation of the benefits (reduced direct and indirect mortality) of this barrier under a full range of Vernalis streamflow and water export conditions should be completed as soon as possible, and before the final decision to construct and operate a permanent barrier. Much of this work may be completed as part of the South Delta Water Management Project.

- h. Use operational criteria that optimize screening efficiencies (e.g., approach velocities) for salmon at the State and Federal water export facilities during San Joaquin smolt outmigrations.

Evaluations of screen efficiencies have determined the ranges of optimum approach velocities and other criteria for the principle species encountered at the export facilities. Unfortunately the criteria are not the same for all species and there is overlap in their temporal recovery patterns. Therefore decisions on operating criteria must be made. We encourage the operators to utilize the optimum criteria that effectively screen and salvage chinook salmon throughout the months of April and May during the next five years.

- i. Evaluate upgrading existing fish screening facilities and accelerate planning to implement changes.

This is an ongoing process at the State facility and the recent mitigation agreement to offset direct losses at the Federal facility may result in a similar emphasis on upgrading.

- j. Reduce predation losses at Clifton Court Forebay and at Tracy Pumping Plant.

Department of Water Resources and Department of Fish and Game are discussing an evaluation of diverting SWP supplies from Italian Slough instead of Clifton Court Forebay as a possible way to reduce predation losses. Conceptually the large body of water in the forebay would not be present to support the large standing crop of predators thought to be causing high salmon mortality. This Action item may be implemented within the time frame of this Plan and the information developed in the evaluations will be of utility.